

APPARATUS AND METHOD FOR FORMING A ROTATABLE FERROFLUIDIC SEAL BETWEEN A SHAFT AND A HUB

Abstract of the Disclosure

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An apparatus and method are provided for sealing an outer surface 170 of a shaft 175 to an inner surface 165 of a hub 160. The seal includes a magnet 155, with top and bottom pole pieces 260, 265, and a ferrofluid 270 magnetically held in a gap 275 between the pole pieces 260, 265, and the hub 160 or the shaft 175. The top pole piece 260 has a cross-section that is L-shaped, with a horizontal portion 260a parallel to the magnet 155 and a shorter vertical portion 260b facing the shaft 175. In one version, the vertical portion 260b or the portion of the shaft 175 facing it is contoured to provide a flux gradient that axially concentrates the ferrofluid 270 in the gap 275. In another aspect, a catcher 335 is provided to reduce loss of ferrofluid 270 when the ferrofluidic seal 185 used to form an outside seal. In yet another aspect, a stationary ferrofluidic seal 345 is provided for sealing a stationary shaft 350 to a rotating hub 355.